RESEARCH IMPLEMENTATION REPORT

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		59A0446	680493	1/1/2005 – 12/31/2005
Report Date	Report No.	Report Title		
January 25, 2008	SSRP-05/06	Full Scale Load Testing of Sand-Jacks		
Principal Investigator			Research Institution	
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Abstract

A sand-jack is a sand-filled containment frame of steel or wood, generally used as a common component for bridge Falsework to temporarily support girder segments during construction. The load from the structure transfers directly on a timber "plunger," or bearing plate, which in turn is supported on the sand bed. The sand jack is essential since, after the girders and the decks are placed, the Falsework is jammed tightly under the structure and is therefore extremely difficult to remove. Using sand jack allows the sand to be removed, thus allowing the timber plunger or the bearing plate to drop, and thereby removing the support from beneath the structure. Then, the Falsework can be easily dissembled.

Achievement

Office of Earthquake Engineering from Engineering Service Center contracted with University of California, San Diego to research sand-jacks in determining ultimate capacity. Forty-six (46) sand-jacks were constructed and tested to failure. Specimens were varied by sand filler type, number of bands, number of crimps per band, band location, annular gap, with or without corbels, with or without Visqeen liner, nailing configuration and number of nails. Recommendations were made to improve sand-jack design.

Conclusion & Recommendation

The following conclusions are drawn from the results of this research:

- In displacements less than 1-inch, the difference in wood sand-jack stiffness with one, two, or three bands is small.
- Using no banding on a wood sand-jack reduces the stiffness by 50%.
- Ultimate capacity is significantly increase by using more bands.
- Increasing crimp connectors on each band will raise the ultimate capacity with no affect on response stiffness.
- Placing one band at the middle or lower third of the sand-jack has minor affect on capacity or stiffness.
- Closely-spaced base nails increase the stiffness and capacity, but not at displacements less than one inch.
- Using a Visqueen liner appears to have no advantage.
- Although the bearing area is less than 12 inches, performance does not change in placing a 15-inch sand-jack box on a 12-inch corbel with squared corners.
- The 30 mesh sand had a stiffer response than the #16 sand when use with the steel cylinder.
- Less displacement results from a larger plunger or smaller annular gap in tests with the steel cylinder.

It is recommended that each sand-jack box should be nailed together with 2x6 Douglas Fir #2 or better using a 1/2"CDX plywood plunger and base. Filler material should be type 30 mesh sand and all nails to be 16d, 3 at the corners and 2 on each side.

Contract Manager	Technical Support Team
Peter Lee	John Gillis

Implementation Recommendations

Results and recommendations made in the UCSD Report should be reviewed and accepted by Caltrans Falsework experts. Results and recommendations should also be shared and discussed with the industry Falsework experts. Appropriate changes should be made to both the California Falsework Manual and the Caltrans Standard Specifications.

Implementation Measures Taken

Currently in progress as stated above.